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Abstract

This paper presents an evaluation of a series of six learning units on online learning that was developed by the Open University of the Netherlands and offered free of charge to educational professionals in the Netherlands and Belgium. Each unit (called 'micro module') had a study load of two to four hours and addressed didactical, technological, and managerial issues related to designing, developing, and implementing online education.

Professionals in the educational domain showed interest in the micro modules. Over 2400 educational experts indicated in an inventory that they were willing to attend the series. In the end, approximately 1200 professionals participated in one or more modules. Participation decreased from about 900 participants in the first micro module (a general introduction on online education) to about 200 in the last (a module on research on online education). Approximately 120 professionals participated in all modules. Participants were positive about the content. Average ratings on content quality ranged from 6.9 to 7.9 (on a ten-point scale).

The design, development, and implementation of the micro modules had to be completed in a short period of time, and therefore a rapid and agile instructional systems design (ISD) approach had to be applied. Although such an approach puts considerable pressure on the organization, it is essential for a swift implementation of state-of-the-art small learning units. Results of the evaluation on both products (i.e., quality of the micro modules) and processes (i.e., quality of ISD) will be the reference for the transformation of these micro modules into a certified short learning program.

Keywords: online learning, distance education, short learning program.

1. Introduction

Online learning, or 'instruction delivered on a digital device that is intended to support learning' (Clark & Mayer, 2016; Mayer, 2019), is the main constituent of educational programs provided by contemporary universities for distance learning. At the Open University of the Netherlands (OUNL) it features the new educational model, which stresses 'active online learning' as didactic approach (Koper, 2014; Schlusmans, Van den Munckhof, & Nielissen, 2016). For some years now, the university has aimed to deliver all its courses according to the new model of 'active online education'. This ambition has resulted in a large institutional knowledge base on the realization of online learning environments. Since it is an important mission of the OUNL to contribute to the innovation of the Dutch educational system, sharing this knowledge base with educational professionals in the field seems to be a logical next step. Therefore, offering a series of short, thematically structured open learning units to the educational field was regarded as an opportunity to achieve this.

This paper discusses the design, development, and implementation of such a series of open learning units, which were called 'micro modules' due to their intended size and scope. We describe and evaluate both processes (i.e., analyses, design, development, and implementation) and products (i.e., micro modules) and use the ADDIE approach (Branch, 2009) to structure the description and evaluation of results. Before we present this, we briefly elaborate on the micro modules and their relationship to other short and open learning initiatives to provide the reader with a frame of reference.

The idea to offer an open series of micro modules emerged during a brainstorming session in the university's higher management. In close collaboration with Academic Affairs, the Centre of Education and Teacher Professional Development (ECOP in Dutch) adopted the idea and developed it into an agile-like project (cf. Adnan & Ritzhaupt, 2018). This project resulted in a series of six micro modules that addressed online learning topics related to didactics (e.g., active learning), technology (e.g., virtual reality and virtual classrooms), and research (e.g., learning analytics). Table 1 summarizes the structure and content of the six micro modules.

Table 1: Six micro modules on active online education (OE) offered in 2019.

Name	Content	Release date
1. What is OE?	Definitions and experts' opinion on OE	February 4
2. Activating in OE	Didactics and instructional design related to OE	February 18
3. Virtual reality (VR) in OE	VR theory and hands-on experience	March 4
4. The virtual classroom (VC)	VC theory and hands-on experience	March 18
5. Assessment in OE	Integrating online testing in OE	April 8
6. Research on OE	Overview of current trends in OE research	April 29

Note: see https://www.ou.nl/micromodules (information in Dutch).

The micro modules were delivered free of charge to the participants by yOUlearn, the university course management system (Hermans, Kalz, & Koper, 2014; Vogten & Koper, 2018). To some extent the entire set of six modules were similar to a massive open online course (MOOC; Deimann, Lipka, & Bastiaens, 2015; Henderikx, Kreijns, & Kalz, 2017; Kop, Fournier, & Mak, 2011; Magaryan, Bianco, & Littlejohn, 2015). Like a modern MOOC (a) the instructional guidance of participants for units of learning was constrained to a relatively short time period (in our case 1-2 weeks for each module), (b) education consisted of building blocks of equal size (in our case 2-4 hours study load each), (c) the series promoted online interaction between participants, instructors, and content (e.g., by means of discussion forums, blogs, virtual classroom sessions), and (d) the number of participants for each module decreased (in our case appr. n=900 started with the first module and appr. n=200 with the sixth module). Although the set of modules was limited in size (cf. 'short', 'small', 'micro'),

in this form they cannot, as yet, be characterized as a short learning program or SLP as defined by the European Association of Distance Teaching Universities (EADTU). EADTU uses criteria that the current design doesn't meet, such as (a) offering some kind of certification, (b) aiming instruction on complex skill learning or competence development (instead of knowledge acquisition), and (c) –as a consequence of the latter– demanding a study load of at least 5 ECTS Credits (EC) or approximately 140 to 150 hours (EADTU, 2016, Thaler & Bastiaens, 2017). However, based on the unexpectedly high interest of the educational field in the micro modules, the transformation of them into a certified SLP on online learning is currently planned for.

The remainder of this paper evaluates the micro modules and addresses initial ideas about an SLP on online learning. We will first describe the needs analysis that formed the basis for the selection of instructional topics. Secondly, the design, development, and implementation of the micro modules will be elaborated upon (the DDI of ADDIE, see Branch, 2009). Thirdly, descriptive statistics regarding participation and content quality will be presented in an overall evaluation section. Finally, we will reflect on the instructional systems design (ISD) processes and address the aforementioned transformation of modules into an SLP.

2. Needs analysis

An important step was to involve potential participants in the design process (co-creation; see Moerkerke, 2015). At the end of 2018, this group was asked to fill in an online questionnaire on the expectations of the initial setup and content of the micro modules (cf. learning needs).

About 150 potential participants filed about 350 statements on what they wanted to learn. Important topics raised were (a) choosing/not choosing (aspects of) online learning in face-to-face education (e.g., when to instruct online and when to instruct face-to-face), (b) the effectiveness of online education, (c) student engagement in online education, (d) student collaboration in online education, (e) implementing online education in face-to-face curricula (e.g., how to persuade and learn teachers to teach online), (f) online assessment, and (g) online tool use. Based on the needs analysis initial topics for the micro modules were redefined and refined (see Table 1 for an overview of central topics).

3. Synthesis

A project team consisting of educationalists, media experts, evaluation experts, a marketeer, and an overall project leader carried out the design, development, and implementation of the six micro modules. The educationalists were responsible for the content of the modules and acted as online teachers. Each micro module was directed by two educationalists as the subject matter experts. The overall project leader coordinated the design, development, and implementation of each module, and also the development of the multimedia productions that were part of the instructional content (i.e., expert interviews, animations, and infographics).

The design, development, and implementation was phased 'module-wise', meaning that the ISD processes for each module progressed sequentially in a pre-defined order (see Table 1). Design cycles for the modules were agile-like, and the evaluation results related to the implementation of the first micro modules were used as input in the design of subsequent modules (e.g., experiences with discussion forums, weblogs, and feedback in large groups led to the adoption, adaptation, or even suppression of certain forms of interaction in later modules; see also Hermans et al., 2014; Kop et al., 2011).

An important requirement for the design of the modules was that they had to promote active learning (Koper, 2014; Schlusmans et al., 2016). However, this requirement is at odds with the guidance of large groups of participants. As the number of participants was unexpectedly high, we had to redesign interaction and

feedback procedures at short notice (cf. Adnan & Ritzhaupt, 2018; Tripp & Bichelmeyer, 1990). Where redesign was inexpedient, it was decided to increase manpower.

The micro modules were presented to the participants in the course management system of the OUNL, named yOUlearn (Hermans et al., 2014; Vogten & Koper, 2018). A specific template for structuring the micro modules was developed, which steered the ISD processes and ensured that all modules had a similar and recognizable format.

4. Evaluation

The evaluation of the micro modules focuses on (a) module participation and participants, (b) participants' perceived quality of the content, and (c) participants' suggestions for improvement.

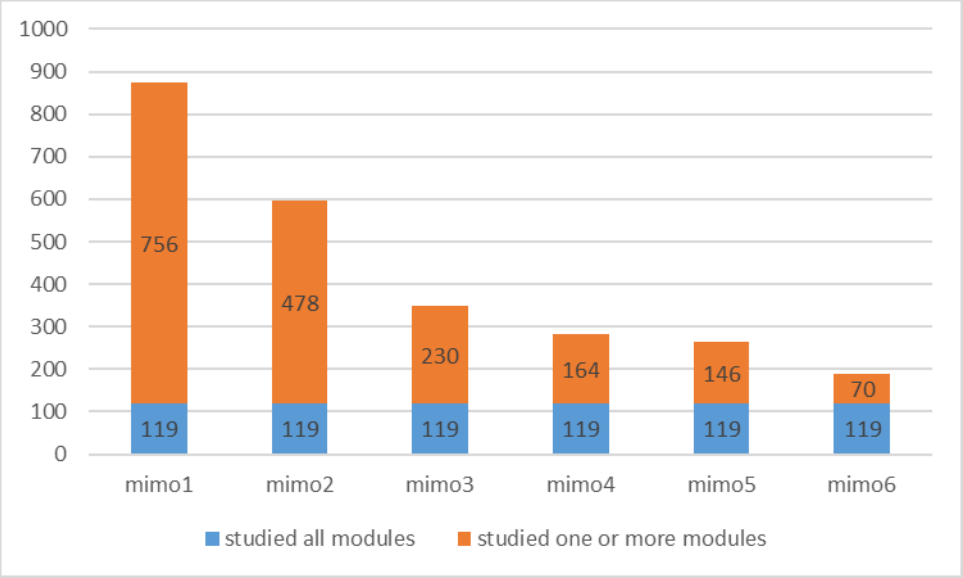

Figure 1. Number of participants per micro module (abbreviation: mimo; count: June 12, 2019).

The number of participants exceeded our expectations. Over 2400 educational experts initially indicated their willingness to attend the series of micro modules. In the end, 1191 professionals participated in one or more modules. Despite these numbers, the ISD project team maintained the principle that active learning should be central to the modules and that some form of interaction between participants, instructors, and content should be achieved. This meant that more teacher effort was needed than initially planned. Most of the participants were professionals in the educational field, of which approximately 24 percent (n=284) were current OUNL students. Participation decreased from 875 participants in the first micro module to 189 in the last. Figure 1 shows the decline of participants. This decreasing curve is a well-known fact in evaluation studies on success in open (and free) online education (Clow, 2013; Henderikx et al., 2017). Despite this decline, it is interesting to see that a cohort of 119 participants (appr. 10%) attended all micro modules (see Figure 1). The number of participants that followed only one module decreased as well. It seems that most participants were mainly interested in basic topics in online education. However, reasons such as participants' lack of time may also have influenced participation.

Participants that filled out the evaluation form were positive about the content of the modules. Ratings on a ten-point scale ranged on average from 6.9 to 7.9. Apart from the third micro module on virtual reality where some participants suffered technical problems, the median score was 8. Table 2 presents the data on content

quality as perceived by the participants. It should be noted that not all participants provided information regarding content quality.

Table 2: Participation and perceived quality.

Module	Participation		Perceived quality ratings		
	Overall	This module only	Mean	Median	Respondents
1	875	410	7.7 (1.08)	8	175
2	597	135	7.9 (0.96)	8	59
3	349	33	6.9 (1.65)	7	33
4	283	38	7.9 (1.93)	8	23
5	265	31	7.8 (1.09)	8	28
6	189	20	7.7 (1,22)	8	20

Note: Rating scale ranged from 0=poor to 10=excellent. Standard deviations between brackets.

We asked participants to share strengths and weaknesses related to the content, delivery, and teaching of the micro modules. Table 3 presents a summary of the participants' comments. These comments included 309 positive remarks (strengths) and 251 recommendations for improvements (weaknesses).

Table 3: Top 5 of strengths and weaknesses related to the micro modules (N=number of mentions).

	Strengths		Weaknesses	
	Topic	N	Topic	N
1	Relevant content	122	Technical and navigation problems	47
2	Structured overview of OE	65	Overwhelming group communication	38
3	Video transcripts and/or summaries	55	Content too superficial	24
4	Short and to the point	45	Videos too long (interviews)	20
5	Hands on experience	42	Insufficient variety	20

The participants valued the content and structure of the instruction. In addition to the instructional scope, the didactical approach of active learning (e.g., in hands on experiences) was appreciated. Despite the attention paid to the technical side of the modules, 'technique' turned out to be an Achilles heel for some of the participants. An interesting question related to 'technique' is how to address technical imperfections in participants' computer hardware and software AND participants' ICT skills. Although the participants valued the content, some of them mentioned a lack of depth in contemporary topics such as big data and learning analytics in online education settings (cf. Vogten & Koper, 2018).

5. Discussion

This paper presented an evaluation of a series of six short learning units on online learning, called micro modules. The focus was on a description of participation and user experiences (i.e., the participants' perceived quality of the instruction offered). Both participation and perceived quality were high, indicating that a specific need was properly met. However, this conclusion must be viewed with some caution. Especially the perceived high quality is based on the response from a portion of the total number of participants. Despite this, we think initial preferences regarding content, didactics, and instructional support can be identified based on this data. We also believe that the participants' desire to explore subjects in greater depth paves the way for a certified SLP. Such an SLP should aim at more 'hand-on experience' and focus on complex skill learning (Van Merriënboer & Kirschner, 2018; Wopereis, Frèrejean, & Brand-Gruwel, 2016) and competence development (Thaler & Bastiaens, 2017). More agile and lean approaches to ISD should be used as means to develop and implement such a short instructional program. Allen's (2017) Successive Approximation Model might be an interesting option for its design and development. An important element in this agile approach is co-creation

(Moerkerke, 2015). Although we already included the participants in our design process (e.g., the needs analysis), their contribution can be enhanced. We also think that the subject matter experts (SMEs, the teachers) should design more as a team, instead of focusing on their own field of expertise and developing a "part of the whole." A co-creating, holistic, and rapid approach to ISD is the key to successful and durable implementations of instruction on fast-changing topics like online learning. Modern distance universities must be able to facilitate this.

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